

## APPENDIX II:

CLAIM AMENDMENTS:

Amend Claims 27, 29, 41, 49, 50 and 53, and enter new Claims 56 and 57, as indicated in the following listing of the claims:

1. - 26. (*canceled*)

27. (*currently amended*) A process for preparing optionally alkyl-substituted 1,4-butanediol by two-stage catalytic hydrogenation in the gas phase of C<sub>4</sub>-dicarboxylic acids and/or of derivatives thereof having the following steps:

- a) introducing a gas stream of a C<sub>4</sub>-dicarboxylic acid or of a derivative thereof at from 200 to 300°C and from 2 to 60 bar into a first reactor and catalytically hydrogenating it in the gas phase to a product which contains mainly optionally alkyl-substituted  $\gamma$ -butyrolactone;
- b) removing succinic anhydride from the product obtained in step a) ~~), preferably to a residual level of from < about 0.3 to 0.2% by weight;~~
- c) introducing the product stream obtained in step b) into a second reactor at a temperature of from 150°C to 240°C and a pressure of from 15 to 100 bar and catalytically hydrogenating it in the gas phase to optionally alkyl-substituted 1,4-butanediol;
- d) removing the desired product from intermediates, by-products and any unconverted reactant;
- e) optionally recycling unconverted intermediates into one or both hydrogenation stages,

said hydrogenation stages each using a catalyst which is free from chromium which comprises  $\leq 95\%$  by weight of CuO, and  $\geq 5\%$  by weight of an oxidic support, and said second reactor having a higher pressure than said first reactor.

28. (*previously presented*) A process as claimed in claim 27, wherein the entrance temperature into the first reactor is from 235 to 270°C and the entrance temperature into the second reactor is from 175°C to 225°C.

29. (*currently amended*) A process as claimed in claim 27, wherein the ~~hot spot temperature~~ catalytic hydrogenation in the first reactor ~~is~~

has a hot spot temperature of from 210 to 310°C, and the process is carried out in such a manner that the hot spot temperature is above the entrance temperature and the exit temperature of the reaction gases, and is from 5 to 30°C above the entrance temperature.

30. (previously presented) A process as claimed in claim 27, wherein the pressure in the first hydrogenation stage is from 2 to 20 bar and the pressure in the second hydrogenation stage is from 35 to 80 bar.
31. (previously presented) A process as claimed in claim 27, wherein the catalyst space velocity of the first hydrogenation stage is in the range from 0.02 to 1 kg of reactant/l catalyst · hour, and the catalyst space velocity of the second hydrogenation stage is in the range from 0.02 to 1.5 kg of reactant/l of catalyst · hour.
32. (previously presented) A process as claimed in claim 27, wherein the hydrogen/reactant molar ratio in both reaction stages is > 5.
33. (previously presented) A process as claimed in claim 32, wherein the hydrogen/reactant ratio in the first stage hydrogenation is from 20 to 200.
34. (previously presented) A process as claimed in claim 27, wherein the reactors used are selected from the group consisting of tubular reactors, shaft reactors, reactors having internal heat removal means, tube bundle reactors and fluidized bed reactors.
35. (previously presented) A process as claimed in claim 34, wherein the tube bundle reactor is used in the first hydrogenation stage.
36. (previously presented) A process as claimed in claim 34, wherein a shaft reactor is used in the second hydrogenation stage.
37. (previously presented) A process as claimed in claim 27, wherein more than one reactor connected in parallel or in series is used in the first and/or second hydrogenation stage.
38. (previously presented) A process as claimed in claim 27, wherein the support material of the catalyst is selected from the group of ZnO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub>, CeO<sub>2</sub>, MgO, CaO, SrO, BaO and Mn<sub>2</sub>O<sub>3</sub> and mixtures thereof.

39. (previously presented) A process as claimed in claim 38, wherein the support material of the catalyst is selected from the group of  $\text{ZnO}/\text{Al}_2\text{O}_3$  mixtures, the delta-, theta-, alpha- and eta- modifications of  $\text{Al}_2\text{O}_3$  and also mixtures which comprise at least one component each firstly from the group of  $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{ZrO}_2$ , and secondly from the group of  $\text{ZnO}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{SrO}$  and  $\text{BaO}$ .
40. (previously presented) A process as claimed in claim 38, wherein the support material is selected from  $\text{ZnO}$ ,  $\text{ZnO}/\text{Al}_2\text{O}_3$  mixtures in a weight ratio of from 100:1 to 1:2 and mixtures of  $\text{SiO}_2$  with at least one of  $\text{MgO}$ ,  $\text{CaO}$  and  $\text{ZnO}$  in a weight ratio of 200:1 to 1:1.
41. (currently amended) A process as claimed in claim 27, wherein the catalyst comprises one or more further metals or a compound of one or more further metals, ~~preferably an oxide~~, from groups 1 to 14 of the Periodic Table.
42. (previously presented) A process as claimed in claim 27, wherein the catalyst is used in the form of shaped bodies.
43. (previously presented) A process as claimed in claim 27, wherein the BET surface area of the copper catalysts in the oxidic state is from 10 to 300  $\text{m}^2/\text{g}$ .
44. (previously presented) A process as claimed in claim 27, wherein the copper surface area of the reduced catalyst in the installed state is  $> 0.2 \text{ m}^2/\text{g}$ .
45. (previously presented) A process as claimed in claim 27, wherein the catalyst used in the first and second reactors are identical or different.
46. (previously presented) A process as claimed in claim 27, wherein the shaped bodies of the catalyst used have a pore volume of  $\geq 0.01 \text{ ml/g}$  for pore diameters of  $> 50 \text{ nm}$ .
47. (previously presented) A process as claimed in claim 27, wherein the ratio of micropores having a diameter of  $> 50 \text{ nm}$  to the total pore volume for pores having a diameter of  $> 4 \text{ nm}$  is  $> 10\%$ .
48. (previously presented) A process as claimed in claim 27, wherein the reactant used in the reaction is maleic anhydride.
49. (currently amended) A process as claimed in claim 27, wherein maleic anhydride is used which has been prepared by oxidizing benzene,  $\text{C}_4$ -olefins or n-butane, and the crude maleic anhydride ob-

tained by oxidation has been extracted from the crude product mixture using ~~a solvent~~ an absorbent and then stripped from this ~~solvent~~ absorbent using hydrogen.

50. (*currently amended*) A process as claimed in claim 27 49, wherein the absorbent is selected from the group consisting of tricresyl phosphate, dibutyl maleate, high molecular weight waxes, aromatic hydrocarbons having a molecular weight of from 150 to 400 and a boiling point above 140°C.
51. (*previously presented*) A process as claimed in claim 50, wherein the absorbent is selected from the group consisting of dibenzene, di-C<sub>1</sub>-C<sub>4</sub> alkyl esters of aromatic and aliphatic dicarboxylic acids, methyl esters of long-chain fatty acids having from 14 to 30 carbon atoms, high boiling ethers, dimethyl ethers of polyethylene glycol and alkyl phthalates and dialkyl phthalates having C<sub>1</sub>-C<sub>18</sub> alkyl groups.
52. (*previously presented*) A process as claimed in claim 50, wherein the absorbent is selected from the group consisting of dimethyl-2,3-naphthalene dicarboxylate, dimethyl-1,4-cyclohexane dicarboxylate, tetraethylen glycol, dimethyl phthalate, diethyl phthalate, dibutyl phthalate, di-n-propyl and di-isopropyl phthalate, undecyl phthalate, diundecyl phthalate, methyl phthalate, ethyl phthalate, butyl phthalate, n-propyl phthalate and isopropyl phthalate.
53. (*currently amended*) A process as claimed in claim 27 49, wherein the maleic anhydride is stripped from the absorbent under reduced pressure or pressures which correspond to the hydrogenation pressure or are a maximum of 10% above this pressure.
54. (*previously presented*) A process as claimed in claim 27, which is carried out batchwise, semicontinuously or continuously.
55. (*previously presented*) A process as claimed in claim 27, wherein the SA is removed by partial condensation.
56. (*new*) A process as claimed in claim 27, wherein the succinic anhydride is removed from the product obtained in step a) to a residual level of from < about 0.3 to 0.2% by weight.
57. (*new*) A process as claimed in claim 41, wherein the compound of the one or more further metals is an oxide.